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The General Principle of Relativity in its Philosophical and Historical Aspect. By H. WILDON CARR. London, Macmillan & Co., 1920.—pp. x, 166.

The first six chapters of this valuable little book are devoted mainly to historical aspects of the theory of relativity. Space, time, and movement are metaphysical concepts which have always played an important part in scientific and philosophical theories from the days of Democritus to those of Einstein. When united with an atomistic conception of matter these concepts have often led to a philosophical materialism, as in the case of Democritus and of some of the perhaps too enthusiastic followers of Newton. The dualistic system of Descartes, however, with its principle of the relativity of all motion, presents a different world-view—a mechanistic conception,—"in outward resemblance . . . extraordinarily like that which is presented to us by the general principle of relativity" (p. 73). But the new physics is based upon a dynamic conception of matter so that in essence it is much more closely analogous to Leibniz's system. In short after two hundred years of successful application of Newtonian principles (the Laws of Motion, and 'absolute' space, time and motion) to its problems, "physical science . . . is [now] seeking a principle which will enable it to coördinate observations from individual centers of experience (monads), without the aid of and recognizing the impossibility of having absolute standards of reference independent of the observers" (p. 118). Chapter VII of Professor Carr's book deals with the scientific structure of the relativity theory in language which the average reader can easily understand. The eighth and last chapter presents the author's conclusions. Absolute space and time are banished from the domain of physical science and there is substituted in their stead the conception of a truly infinite universe of four dimensions—three for space and one for time. "It seems to me, therefore," declares Professor Carr, "that the principle of relativity is a philosophical principle which is not only called for by the need of mathematical and physical science . . . but is destined to give us a new world-view" (p. 160). "Carried to its logical conclusion the principle of relativity leaves us without the image or the concept of a pure objectivity" (p. 162). In other words, physical science as well as philosophy is teaching that there can be no object without a subject.—Whether or not the philosophical reader be prepared completely to accept the analogy between the principles of Leibniz's metaphysical system and those of Einstein's physical theory, and even if the mathematician should choose to regard the mathematical criterion of invariancy employed in connection with Einstein's equations as a 'purely objective' standard, the essential value of Professor Carr's book, in calling attention to the important historical antecedents of Einstein's theory, will still remain.

H. R. SMART.